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GEOMYDOECUS (MALLOPHAGA: TRICHODECTIDAE) FROM THE TEXAS AND DESERT POCKET GOPHERS (RODENTIA: GEOMYIDAE)

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Abstract.—*Geomydoecus truncatus* Werneck and *G. quadridentatus* Price and Emerson are redescribed and illustrated. The new species ***G. neotruncatus*** is described, with the type host being *Geomys personatus streckeri* Davis.

Key Words: lice, *Geomys arenarius, Geomys personatus*

Since the initial revision of the pocket gopher lice by Price and Emerson (1971), most of the taxa of the louse genus *Geomydoecus* Ewing occurring on the host genus *Geomys* Rafinesque have been the subject of re-examination and further study and analysis. The principal works dealing with these lice are those by Price and Hellenthal (1975) on the *Geomydoecus texanus* complex, Price (1975) on the *G. scleritus* complex, and Timm and Price (1980) on the *G. geomydis* complex. This last work presents keys to the males and females of all *Geomydoecus* known to that time from *Geomys* gophers. It is the purpose of the present paper to complete the taxonomic study of lice from *Geomys* by considering the *Geomydoecus truncatus* complex from the Texas pocket gopher, *Geomys personatus* True, and the *Geomydoecus quadridentatus* complex from the desert pocket gopher, *Geomys arenarius* Merriam.

Quantitative data for the lice studied in this paper combined with host and locality information form part of a computerized pocket gopher-louse data base maintained at the University of Notre Dame. Counted or measured characters in the following descriptions are followed by the minimal and maximal observed values, and, in parentheses, the sample size, mean, and standard deviation. All measurements are in millimeters. In evaluating character usefulness for specific discrimination, critical values for each character were calculated at the point where the likelihood of single character misidentification of the two compared taxa was equal, given normality and equal variance, and ignoring the probability of collection. For characters offering moderately good discriminating ability, these critical values and the corresponding probabilities of misidentification are given. In an abbreviated comparative description for a species, quantitative data are given only for those characters whose means differ at a significance level of $P \leq 0.01$. The host distribution map was produced by a computer from a pocket gopher/louse association data base (Hellenthal and Price 1984). The map projection is rectangular to simplify determination of the latitude and longitude for individual collection sites. Original locality data expressed in miles are followed parenthetically by the metric equivalent to 0.1 km; the English figure, rather than the metric, expresses the precision of the location estimate. Abbreviations used for host accession numbers are KU (University of Kansas), TAM (Texas A&M University), and TT (Texas Tech University). Detailed descriptions of the characters and quantitative procedures used for *Geomydoecus* lice are included in Hellenthal and Price (1980).

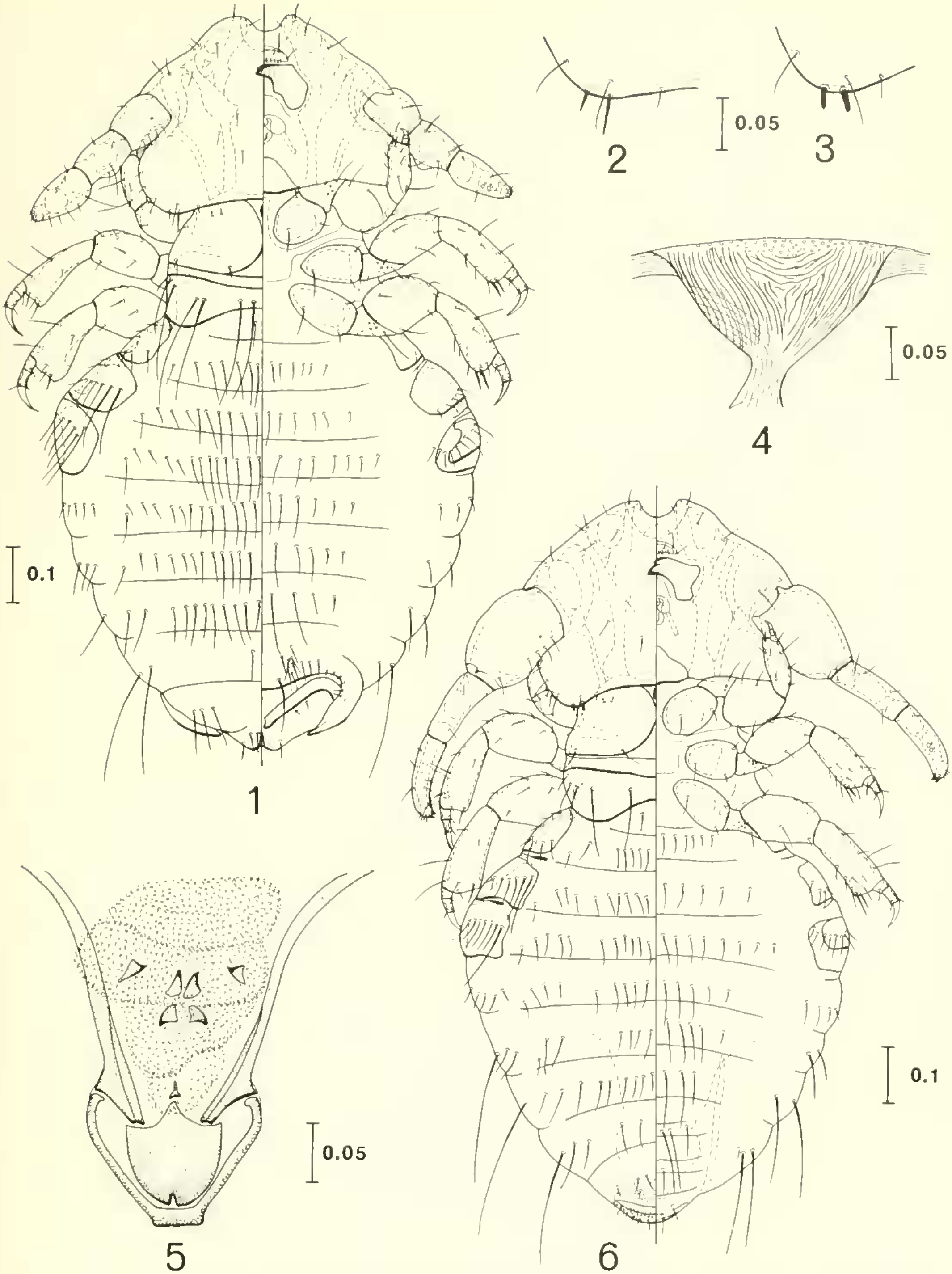
Geomydoecus truncatus **Werneck**
Figs. 1–6

Geomydoecus truncatus Werneck, 1950: 13. Type host: *Geomys personatus personatus* True.

Male.—As in Fig. 6. Temple width (TW) 0.435–0.470 (26: 0.450 ± 0.0096); head length (HL) 0.325–0.360 (26: 0.338 ± 0.0089); submarginal and inner marginal temple setae 0.030–0.045 (15: 0.036 ± 0.0046) and 0.020–0.030 (24: 0.025 ± 0.0015) long, respectively, with submarginal seta positioned near inner marginal seta and both marginal setae blunt, spiniform (Fig. 3). Antenna with scape length (SL) 0.180–0.200 (23: 0.191 ± 0.0057), scape medial width (SMW) 0.110–0.125 (23: 0.119 ± 0.0054), scape distal width (SDW) 0.110–0.130 (23: 0.122 ± 0.0054); without projection on posterior margin. Prothorax width (PW) 0.320–0.345 (26: 0.330 ± 0.0069). Abdominal tergal setae: I, 2; II, 12–16 (26: 14.0 ± 1.18); III, 16–24 (26: 19.6 ± 1.68); IV, 19–25 (26: 22.3 ± 2.00); V, 16–25 (26: 19.9 ± 2.13); VI, 13–20 (26: 15.8 ± 1.83); tergal and pleural setae on VII, 18–22 (26: 20.5 ± 1.21). Abdominal sternal setae: II, 9–12 (25: 10.5 ± 0.96); III, 9–15 (26: 11.5 ± 1.30); IV, 11–15 (26: 13.2 ± 1.08); V, 8–12 (25: 10.1 ± 1.15); VI, 6–9 (24: 7.7 ± 0.85); VII, 6–9 (25: 6.9 ± 0.91); VIII, 4–8 (25: 6.1 ± 0.86). Total length (TL) 1.210–1.385 (25: 1.285 ± 0.0511). Genitalia as in Fig. 5; spinose sac with 6 medium spines; parameral arch flattened medioposteriorly, width (PAW) 0.140–0.160 (23: 0.154 ± 0.0057); endomeral plate broadly rounded, with small medioposterior notch, width (EPW) 0.075–0.090 (26: 0.085 ± 0.0037), length (EPL) 0.075–0.100 (24: 0.087 ± 0.0054).

Female.—As in Fig. 1. TW 0.475–0.500 (23: 0.483 ± 0.0073); HL 0.310–0.345 (23: 0.327 ± 0.0083); submarginal and inner marginal temple setae 0.030–0.050 (17: 0.037 ± 0.0055) and 0.035–0.045 (22: 0.040 ± 0.0031) long, respectively, with submarginal seta positioned near inner marginal seta (Fig. 2). PW 0.340–0.385 (23: 0.356 ± 0.0119). Abdominal tergal setae: I, 2; II, 14–18 (23: 16.3 ± 1.05); III, 20–25 (23: 22.4 ± 1.38); IV, 23–30 (23: 26.2 ± 1.95); V, 24–28 (23: 25.6 ± 1.08); VI, 21–25 (23: 23.4 ± 1.23); tergal and pleural setae on VII, 24–34 (23: 28.4 ± 2.31). Longest seta of medial 10 on tergite VI, 0.075–0.090 (22: 0.084 ± 0.0040); on tergite VII, 0.090–0.120 (23: 0.102 ± 0.0074), with 0–2 (23: 0.6 ± 0.79) of these longer than 0.100. Longer of medial pair of setae on tergite VIII, 0.060–0.085 (22: 0.073 ± 0.0070). Last tergite with 3 lateral setae close together on each side; outer, middle, and inner setae 0.070–0.095 (19: 0.082 ± 0.0067), 0.080–0.105 (20: 0.092 ± 0.0067), and 0.080–0.105 (19: 0.095 ± 0.0057) long, respectively. Abdominal sternal setae: II, 9–13 (23: 10.6 ± 0.84); III, 9–13 (23: 11.5 ± 1.04); IV, 12–17 (22: 14.4 ± 1.50); V, 10–14 (22: 12.0 ± 1.21); VI, 8–13 (22: 10.8 ± 1.60); VII, 6–10 (22: 7.7 ± 1.16). Subgenital plate with 18–23 (23: 21.2 ± 1.53) setae, with distribution and lengths as in Fig. 1, with 1 seta on each side distinctly longer and thicker than others. TL 1.165–1.410 (21: 1.271 ± 0.0525). Postvulval sclerite as in Fig. 1, with 2 subequal short setae posterior to it on each side. Genital sac as in Fig. 4, width (GSW) 0.200–0.280 (17: 0.248 ± 0.0195), length (GSL) 0.100–0.180 (17: 0.132 ± 0.0251); with weak anterior papillose area and with 0–5 (17: 2.1 ± 1.82) transverse anterior lines, posteriormost line, when present, situated 0.020–0.060 (12: 0.042 ± 0.0121) back from anterior sac margin.

Discussion.—The male of *G. truncatus* is



Figs. 1–6. *Geomydoecus truncatus.* 1, Female dorsal (left)—ventral (right) view. 2, Female dorsal left temple margin. 3, Male dorsal left temple margin. 4, Female genital sac. 5, Male ventral genitalia. 6, Male dorsal (left)—ventral (right) view. Measurements are in millimeters.

easily distinguished from all other *Geomydoecus* by its uniquely shaped parameral arch; no other described species of this genus has the distinctive medioposterior flattening. The female is not as readily differentiated, but the combination of the genital sac structure, dimensions, and chaetotaxy features should separate it.

Werneck (1950) described *G. truncatus* from a series of six males taken off *Geomys personatus* from Padre Island, Texas. This locality would make the host *G. p. personatus*, the only pocket gopher that Hall (1981) lists from there. However, we have found only *Geomydoecus texanus texanus* Ewing on that host. The paucity of our records cannot rule out the possibility that *G. truncatus* may also occur there, but, conversely, we are unable to confirm that it does. Our inability to do this becomes critical since we have now determined that what has been known as *G. truncatus* actually consists of two species—one from *Geomys p. streckeri* Davis and the other from *G. p. fallax* Merriam. Price and Emerson (1971) had specimens only from *G. p. streckeri* and named them *Geomydoecus truncatus*. Numerous subsequent collections from *Geomys p. fallax* and the determination that these were different from the *G. p. streckeri* lice raised the necessity of establishing which is the true *Geomydoecus truncatus*. Fortunately, we have been able to examine two of Werneck's paratypes and have determined that they are conspecific with our series from *Geomys p. fallax*.

Geomys p. fallax also has *Geomydoecus texanus texanus* occurring on it. Of the six gophers of this host taxon that yielded *G. t. texanus*, only one also had *G. truncatus*. This one gopher had 12 *G. truncatus* and only one specimen of *G. t. texanus*, raising the possibility that the latter might have been a contaminant or straggler. It appears that these two louse taxa, although found on the same host subspecies, occur in exclusive ranges.

Material examined.—2 ♂, Paratypes of *Geomydoecus truncatus*, ex *Geomys personatus*, Padre Island, Texas; 53 ♀, 57 ♂, ex *G. p. fallax*, 9 gophers from 7 localities in San Patricio Co., Nueces Co., and Live Oak Co., Texas.

Geomydoecus neotruncatus Hellenthal and Price, New Species

Type host: Geomys personatus streckeri Davis.

Male.—Much as for *G. truncatus*, except as follows. TW 0.405–0.430 (20: 0.420 ± 0.0053); HL 0.310–0.345 (20: 0.326 ± 0.0077). Antennal SL 0.165–0.185 (19: 0.177 ± 0.0051), SMW 0.100–0.120 (19: 0.109 ± 0.0058), SDW 0.100–0.120 (19: 0.112 ± 0.0047). PW 0.305–0.335 (20: 0.309 ± 0.0078). Setae on sternite II, 7–11 (20: 9.1 ± 1.02); VI, 8–12 (19: 9.5 ± 0.90). Genitalia PAW 0.140–0.155 (20: 0.145 ± 0.0048).

Female.—Much as for *G. truncatus*, except as follows. TW 0.440–0.465 (20: 0.448 ± 0.0077); HL 0.300–0.330 (20: 0.316 ± 0.0075); inner marginal temple seta 0.035–0.045 (20: 0.037 ± 0.0030) long. PW 0.325–0.340 (20: 0.329 ± 0.0061). Tergal setae: II, 13–17 (20: 15.0 ± 1.23); III, 18–23 (20: 21.0 ± 1.49); IV, 20–28 (20: 23.9 ± 1.65); V, 20–26 (20: 24.2 ± 1.65). Longer seta of medial pair on tergite VIII, 0.050–0.075 (19: 0.062 ± 0.0068). Outer seta on last tergite 0.060–0.085 (20: 0.075 ± 0.0057) long. Sternal setae: II, 8–11 (20: 9.7 ± 0.91); V, 10–15 (20: 13.0 ± 1.10); VI, 9–14 (20: 12.3 ± 1.22); VII, 8–11 (20: 9.6 ± 0.88).

Discussion.—Both sexes of *G. neotruncatus* are smaller than *G. truncatus* and tend to have fewer abdominal tergal setae and more sternal setae on the posterior segments. For males, the critical values for discrimination and probabilities of misidentification for the best discriminating quantitative characters separating these two taxa are the temple width 0.435 (0.034), prothorax width 0.320 (0.085), and scape length 0.184 (0.109). For females, the best are temple width 0.466 (0.009), prothorax width 0.343 (0.081), and setae on sternite VII 8.69 (0.177).

The males of both species key to *G. truncatus* in the first half of couplet 6 in Timm and Price (1980), where *G. neotruncatus* can be separated by its temple width less than 0.435 and prothorax width less than 0.320. The females of both species key either to *G. truncatus* in couplet 2 or *G. quadridentatus* Price and Emerson in couplet 9. Temple width under 0.466 and prothorax width under 0.343 will distinguish *G. neotruncatus* from *G. truncatus*; both may be separated from *G. quadridentatus* by their shorter setae on pleurites III–IV (Fig. 1 vs. Fig. 7) and differences in the genital sac configuration (Fig. 4 vs. Fig. 8).

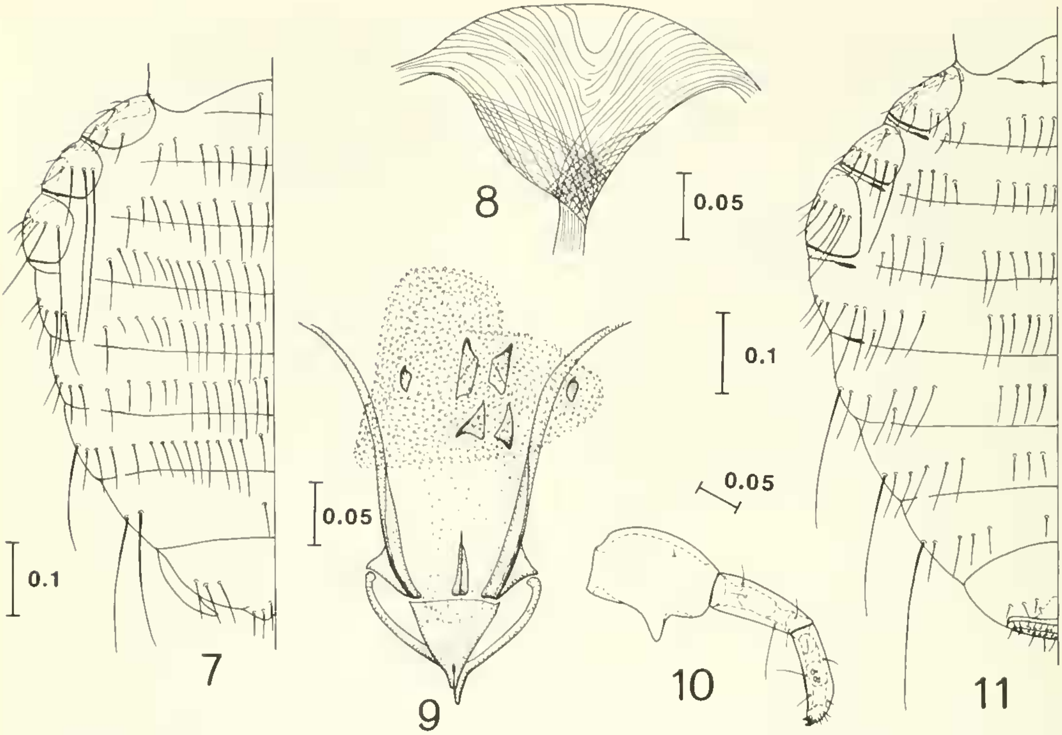
Material examined.—Holotype ♀, ex *Geomys personatus streckeri*, 14 mi (22.5 km) W Crystal City, Zavala Co., Texas, 9.II.1953, KU-52238; in collection of the University of Kansas. Paratypes, ex *G. p. streckeri:* ♀, 7 ♂, same as holotype; 22 ♀, 17 ♂, same except KU-52239 or 10.II.1953, KU-52245, 52246; 13 ♀, 11 ♂, E Carrizo Springs, Dimmit Co., Texas, 4.I.1970, TT-9665, 9666; 6 ♀, 4 ♂, 13 mi (20.9 km) N or NE Carrizo Springs, Dimmit Co., Texas, 17.I.1970, TT-10126, 10131; 1 ♀, 1 mi (1.6 km) SW Carrizo Springs, Dimmit Co., Texas, 23.V.1974, TAM-27613; 5 ♀, 4 ♂, Carrizo Springs, Dimmit Co., Texas, 24.XI.1938, TAM-789; paratypes distributed among the United States National Museum of Natural History, Field Museum of Natural History, University of Minnesota, and Oklahoma State University.

Geomydoecus quadridentatus Price and Emerson
Figs. 7–11

Geomydoecus quadridentatus Price and Emerson, 1971: 240. Type host: *Geomys arenarius arenarius* Merriam.

Male.—Grossly as in Fig. 6, except antenna as in Fig. 10, and dorsal abdomen as in Fig. 11. TW 0.365–0.410 (80: 0.392 ± 0.0100); HL 0.270–0.325 (79: 0.295 ± 0.0126); submarginal and inner marginal temple setae 0.040–0.065 (73: 0.052 ± 0.0051) and 0.020–0.030 (79: 0.024 ± 0.0023) long, respectively. Antenna with SL 0.145–0.175 (80: 0.164 ± 0.0069), SMW 0.095–0.120 (80: 0.109 ± 0.0062), SDW 0.115–0.150 (80: 0.135 ± 0.0082); with prominent process on posterior margin (Fig. 10). PW 0.265–0.315 (79: 0.289 ± 0.0112). Abdominal tergal setae: I, 2; II, 8–16 (80: 12.2 ± 1.43); III, 14–23 (78: 18.7 ± 1.65); IV, 17–27 (78: 21.1 ± 2.03); V, 16–26 (78: 19.5 ± 1.90); VI, 11–19 (78: 15.0 ± 1.54); tergal and pleural setae on VII, 15–24 (80: 20.2 ± 1.69). Abdominal sternal setae: II, 9–15 (79: 11.7 ± 1.49); III, 11–17 (79: 13.9 ± 1.39); IV, 11–19 (80: 14.3 ± 1.62); V, 8–14 (80: 10.8 ± 1.42); VI, 6–11 (79: 9.2 ± 1.13); VII, 5–9 (77: 7.3 ± 0.91); VIII, 5–7 (79: 5.9 ± 0.51). TL 1.130–1.415 (79: 1.245 ± 0.0634). Genitalia as in Fig. 9; spinose sac with 4 large central and 0–2 smaller laterally displaced spines; parameral arch with prominent medioposterior projection, PAW 0.130–0.155 (79: 0.144 ± 0.0052); endomeral plate triangular with short apical division, EPW 0.065–0.080 (80: 0.072 ± 0.0035), EPL 0.060–0.080 (80: 0.071 ± 0.0049).

Female.—Grossly as in Fig. 1, except dorsal abdomen as in Fig. 7. TW 0.400–0.470 (80: 0.439 ± 0.0122); HL 0.260–0.310 (80: 0.283 ± 0.0098); submarginal and inner marginal temple setae 0.040–0.070 (78: 0.054 ± 0.0051) and 0.040–0.050 (78: 0.045 ± 0.0036) long, respectively. PW 0.280–0.345 (80: 0.311 ± 0.0120). Abdominal tergal setae: I, 2; II, 13–19 (78: 15.2 ± 1.40); III, 19–27 (77: 21.8 ± 1.94); IV, 20–30 (77: 24.6 ± 2.40); V, 18–28 (78: 22.5 ± 2.21); VI, 16–26 (79: 20.9 ± 2.38); tergal and pleural setae on VII, 25–39 (80: 32.4 ± 2.95). Longest seta of medial 10 on tergite VI, 0.070–0.100 (80: 0.087 ± 0.0062); on tergite VII, 0.085–0.115 (80: 0.102 ± 0.0069), with 0–6 (80: 0.9 ± 1.44) of these longer



Figs. 7–11. *Geomydoecus quadridentatus.* 7, Female dorsal abdomen. 8, Female genital sac. 9, Male ventral genitalia. 10, Male ventral antenna. 11, Male dorsal abdomen. Measurements are in millimeters.

than 0.100. Longer of medial pair of setae on tergite VIII, 0.050–0.085 (79: 0.067 ± 0.0082). Last tergite with outer, middle, and inner setae 0.045–0.075 (74: 0.058 ± 0.0064), 0.060–0.090 (74: 0.074 ± 0.0065), and 0.060–0.090 (79: 0.076 ± 0.0069) long, respectively. Abdominal sternal setae: II, 8–16 (79: 11.9 ± 1.77); III, 11–17 (77: 14.3 ± 1.26); IV, 11–19 (79: 15.0 ± 1.75); V, 8–16 (78: 11.8 ± 1.51); VI, 7–12 (78: 9.6 ± 1.02); VII, 6–11 (78: 8.8 ± 0.96). Subgenital plate with 18–26 (80: 21.7 ± 2.07) setae. TL 1.090–1.335 (79: 1.198 ± 0.0532). Genital sac as in Fig. 8, GSW 0.175–0.255 (79: 0.206 ± 0.0144), GSL 0.155–0.200 (77: 0.181 ± 0.0115), with 0–4 (79: 2.1 ± 0.82) curved medioanterior loops, posteriormost loop, when present, situated 0.040–0.105 (78: 0.071 ± 0.0115) back from anterior sac margin.

Discussion.—Both sexes of *G. quadridentatus* are easily separated from *G. truncatus* and *G. neotruncatus.* Males of *G. quadridentatus* have conspicuously different genitalia (Fig. 9 vs. Fig. 5), the antennal scape with a posterior process (Fig. 10), and dorsal abdominal chaetotaxy (Fig. 11) with longer setae on pleuron V, generally longer lateral tergal setae, and the three short setae on each side of the last tergite evenly spaced and aligned with very short seta as shown. Females of *G. quadridentatus* have a different line configuration of the genital sac (Fig. 8 vs. Fig. 4) and longer pleural setae at least on abdominal segments III–V (Fig. 7). These three species of lice also are well separated geographically, with *G. quadridentatus* distributed in north central Chihuahua, western Texas, and south central New Mexico, and with *G. truncatus* and *G. neotruncatus* in south central Texas (Fig. 12).

As originally described by Price and Emerson (1971), males of *G. quadridentatus* were said to have only four large genital sac spines, with no mention of one or two smaller laterally displaced spines. However, recent examination of much larger series of lice than were available earlier has shown 94 of 179 (52.5%) males with only the four large central spines, 46 (25.7%) with a single smaller additional spine, and 39 (21.8%) with two smaller spines as in Fig. 9. The percentage of gophers with no, one, or two smaller sac spines is essentially the same for all gopher populations of *G. quadridentatus* studied. The presence of these smaller spines should not complicate proper identification, if other characters and host association are considered.

There is discussion among mammalogists as to whether *Geomys arenarius* is a valid species apart from *G. bursarius* (Shaw). Also uncertain are the relationships among up to five populations of *Geomys* possessing what we here call *Geomydoecus quadridentatus*: 1) gophers around Gran Quivera, New Mexico; 2) gophers around San Antonio, New Mexico; 3) gophers considered to be *G. a. brevirostris* Hall; 4) a "river" population of gophers belonging to *G. a. arenarius*; and 5) an "upland" population of *G. a. arenarius*. We collected numerous lice from all five of these groups, analyzed them qualitatively and quantitatively, and could find no meaningful differences. We could demonstrate occasional quantatitive character differences at a relatively high probability of misidentification, but these showed no consistent occurrence. We do not believe these louse populations merit taxonomic distinctions at this time. Speaking strictly from the louse standpoint, the lice from all five populations are sufficiently different from lice from *Geomys bursarius* to support *G. arenarius* as a separate taxon and sufficiently similar to each other to group all five gopher populations into *G. arenarius*.

Material examined.—244 ♀, 267 ♂, ex *Geomys arenarius arenarius*, 50 gophers from 17 localities in New Mexico, Texas, and Chihuahua; 67 ♀, 51 ♂, ex *G. a. brevirostris*, 15 gophers from 6 localities in New Mexico; 26 ♀, 22 ♂, ex *Geomys*, 7 gophers from 2 localities near Gran Quivera, New Mexico; 35 ♀, 28 ♂ ex *Geomys*, 4 gophers near San Antonio, New Mexico.

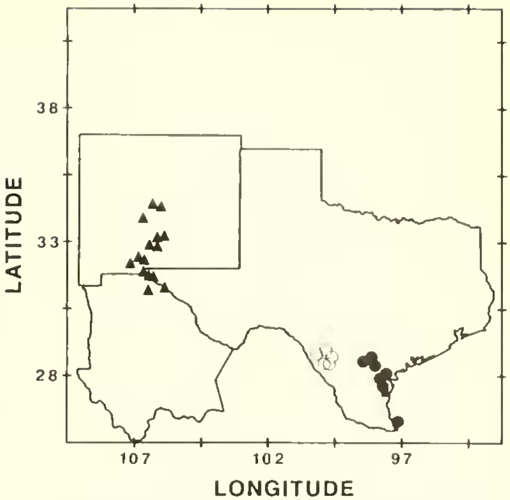


Fig. 12. Geographic distribution of *Geomydoecus truncatus* (closed circles), *G. neotruncatus* (open circles), and *G. quadridentatus* (triangles).

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